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Standard Methods of Testing Spill Control Barrier Membrane Materials[1]

This standard is issued under the fixed designation F 715; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 These methods cover laboratory-conducted performance tests for spill control barrier membrane materials.

1.2 *This standard may involve hazardous materials, operations, and equipment. This standard does not purport to address all of the safety problems associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*

D 543 Test Method for Resistance of Plastics to Chemical Reagents[2]
D 751 Methods of Testing Coated Fabrics[3]
D 882 Test Methods for Tensile Properties of Thin Plastic Sheeting[2]
D 975 Specification for Diesel Fuel Oils[4]
D 1004 Test Method for Initial Tear Resistance of Plastic Film and Sheeting[2]
D 2261 Test Method for Tearing Strength of Woven Fabrics by the Tongue (Single Rip) Method (Constant-Rate-of-Extension Tensile Testing Machine)[5]
D 2262 Test Method for Tearing Strength of Woven Fabrics by the Tongue (Single Rip) Method (Constant-Rate-of-Traverse Tensile Testing Machine)[5]

2.2 *Federal Standard:*

Fed. Std. No. 191B Textile Test Methods[6]

2.3 *Military Specification:*

MIL-T-6396 C Tank, Fuel, Oil, Water-Alcohol, Coolant Fluid, Aircraft, Non-Self-Sealing, Removable, Internal[6]

3. Significance and Use

3.1 Membrane materials are subjected to these tests in order to provide data that reasonably relate to membrane response under the actual conditions of spill control barrier use.

3.2 Although these methods provide data on individual performance characteristics of membrane materials, all combinations of actual conditions of spill control barrier use are not simulated in this sequence of tests.

4. Base Line Tests

4.1 *Number of Specimens*—Subject seven specimens of spill control membrane materials to tests prescribed in 4.2 through 4.6. Perform all tests parallel and perpendicular to the axis of barrier when in use.

4.2 *Tensile Strength:*

4.2.1 *Supported Materials*—Fed. Std. No. 191B Method 5102 (cut strip), equivalent to Method D 751.

4.2.2 *Unsupported Materials*—Dumb Bell Sample, Method D 882, measured in pound-force per square inch.

4.3 *Tear Strength:*

4.3.1 *Supported Materials*—Fed Std No. 191B Method 5134 (tongue tear) equivalent to Methods D 2261 or D 2262. If standard sample does not achieve true tear or if fabric design requires roping to achieve high tear, sample size may be enlarged in order to achieve cord breakage, but all other procedures must be maintained. Such sample size change must be recorded in test results.

4.3.2 *Unsupported Materials*—Graves Method D 1004.

4.4 *Adhesion*—Fed Std. No. 191B Method 5970, after 5 days at 70°C in water, or Method D 751, after 5 days at 70°C in water.

4.5 *Puncture Resistance*—MIL-T-6396 C.

4.6 *Hydrostatic Resistance*—Fed. Std. No. 191B Method 5512 (Mullen Hydrostatic Test).

4.7 *Storage Life*—To be determined.

4.8 *Mildew*—Fed. Std. No. 191B Method 5762 (Mixed Cidal Spore Test).

5. Weather and Petroleum Sample Tests Related to Base Line Tests

5.1 *Specimen Preparation*—Subject samples of spill control barrier membrane material to the following preparations: weather resistance to be followed by resistance to petroleum products:

5.1.1 *Weather Resistance*—Fed. Std. No. 191B Method 5804, 500-h exposure.

5.1.2 *Resistance to Petroleum Products*—Method D 543, with 96-h exposure to No. 2 diesel stock as prescribed in Specification D 975, at ambient temperature.

5.2 *Weather and Petroleum Sample Test*—Perform each of the following tests within 1 h of the termination of the test in 5.1.2.

5.2.1 *Tensile Strength:*

5.2.1.1 *Supported Materials*—Same as base line test (4.2.1).

5.2.1.2 *Unsupported Materials*—Same as base line test (4.2.2).

5.2.2 *Tear Strength:*

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[1] These methods are under the jurisdiction of ASTM Committee F-20 on Hazardous Substances and Oil Spill Response and are the direct responsibility of Subcommittee F20.11 on Control.

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[2] *Annual Book of ASTM Standards*, Vol 08.01.

[3] *Annual Book of ASTM Standards*, Vol 09.02.

[4] *Annual Book of ASTM Standards*, Vol 05.01.

[5] *Annual Book of ASTM Standards*, Vol 07.01.

[6] Available from Naval Publications and Forms Center, 5801 Tabor Ave., Philadelphia, PA 19120.

5.2.2.1 *Supported Materials*—Same as base line test (4.3.1).

5.2.2.2 *Unsupported Materials*—Same as base line test (4.3.2).

5.2.3 *Adhesion*—Same as base line test (4.4). Samples shall be heat-sealed or cemented.

5.2.4 *Puncture Resistance*—Same as base line test (4.5).

5.2.5 *Hydrostatic Resistance*—Same as base line test (4.6).

5.3 *Interpretation of Results*—The results of each test in 5.2 shall be compared with the results of the same test in Section 4, and a percentage of change shall be noted.

6. Weather and Petroleum Sample Tests Followed by Hydrostatic Resistance, Related to Base Line Hydrostatic Test

6.1 *Specimen Preparation*—Use the three remaining samples from 5.1 for the tests in 6.2 and 6.3.

6.2 *Weather and Petroleum Sample Tests*—Perform each of the following tests within 1 h of the termination of the test in 5.1.2.

6.2.1 *Abrasion Resistance*—Fed. Std. No. 191B Method 5306 (Taber), using a H18 wheel and 1000-gf load, abraded 300 cycles.

6.2.2 *Low-Temperature Resistance*—Fed. Std. No. 191B Method 5874, at 2 h soak at −29°C with 2.5 kg mandrel roller weight.

6.2.3 *Flexibility*—To be determined.

6.3 *Hydrostatic Test*—Test for hydrostatic resistance in accordance with 4.6.

6.4 *Interpretation of Results*—The results of each test in 6.3 shall be compared with the results of 4.6, and a percentage of change shall be noted.

7. Precision and Bias

7.1 The precision and bias of test measurements are addressed in each individual test method cited in Sections 3, 4, and 5.

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